

Memoirs of the Museum of Comparative Zoölogy

AT HARVARD COLLEGE.

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THE CHISMOPNEA (CHIMAEROIDS).

BY

SAMUEL GARMAN.

CAMBRIDGE, U. S. A.:

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The classification of this group of the fishes with cartilaginous fins and the reasons for the same are indicated in the synopses given below.

CHONDROPTERYGII.

Chondropterygii (part) LINNÉ, 1735, *Systema*, ed. 1; 1756, *Syst.*, ed. 9, p. 41; ARTEDI, 1738, *Syn.*, p. 89, Gen., p. 64; GMELIN, 1789, *Linna. Syst.*, **1**, p. 1183.

Aquatic fish-like vertebrates in which the skeleton is cartilaginous and the skull without sutures; the heart has a conus arteriosus with three to four rows of valves; the brain has an optic chiasma; the intestine has a spiral fold; the teeth resemble the dermal armature and are not implanted in the cartilages of the jaws; the scales are placoid, and the vertical and the paired fins are mostly of horn-like tissue supported by cartilaginous radials; the eggs are large and fertilized internally, the male being provided with intromittent organs, claspers, attached behind the pelvis and the ventral fins; the embryo has deciduous gills.

Gill openings 5-7; gills 5-7; notochord more or less segmented

Dorsal fins rigid, not erectile

Teeth numerous; rostralia fused with the cranium, not articulated

Upper jaws not fused with the skull

Male without frontal and prepelvic tenacula . . . *Plagiostomia*

Gill openings one on each side; gills 4; notochord unsegmented

Dorsal fin and spine erectile

Teeth six, plate-like; rostralia three, articulated to the cranium

Upper jaws and palatal cartilages fused with the skull

Male with frontal and prepelvic tenacula . . . *Chismopneua*

CHISMOPNEA.

Chismopneua RAFINESQUE, 1815, *Analyse de la Nature*, p. 92.
Holocophala MÜLLER, 1834-1835, *Vergl. Anat. Myx.*, **1**, p. 10.

Upper jaws and other palatal cartilages fused with the skull; rostral cartilages three, articulated to the skull. One gill opening; four gill clefts; four

gills, united with the skin distally; opercula rudimentary. Spiracles absent, except in certain embryonic stages. Dental laminae in three pairs, vomerine and palatine above and mandibular below. Brain massed posteriorly, more distributed forward, hemispheres distant from the optic lobes and attached to them by a nerve-like thread. Vertebrae imperfect, coalescent anteriorly. Sheath of the notochord not segmented. An erectile dorsal fin and spine the basalia of which are articulated to a consolidation of the neural spines above the pectoral fins. Oviparous. Male on approaching maturity developing claspers and a frontal tenaculum and two prepelvic tenacula adapted for clinging to the tail and the fins of the female. In some species the wide basal articulation of the frontal tenaculum prevents motion laterally and the hooked spines below its forward end are met by other sharp spines from within the cradle or receptaculum, thus indicating decisively the manner of use and the purpose of the organ. Skin naked in adults, a series of small spines, arranged in two rows along the middle of the back and on the top of the head, aid the escape from the egg shell.

Snout prominent, soft, without a proboscis

Brain with olfactories and hemispheres close together

Notochord surrounded by rings

Teeth with tritons on their edges

Claspers of male trifid, rarely bifid *Chimaeridae*

Snout produced into a long beak

Brain with olfactories and hemispheres widely separated

Notochord with rings

Claspers simple *Rhinochimaeridae*

Snout produced into a leaf-shaped, flexible appendage

Brain with olfactories and hemispheres widely separated

Notochord without rings

Teeth with tritons on their sides

Claspers simple *Callorynchidae*

CHIMAERIDAE.

Chimaera RAFINESQUE, 1815, Anal. Nat., p. 92 (= Chimaera and Morymyrus, = subfam.).

Chimaerac THÉN., 1828, Zoologie, p. 412 (= Chimaera and Callorhynchus).

Chimaeridae BONAP., 1831, Saggio, p. 98, 121 (= Chimaera and Callorhynchus).

Chimaeridae GARM., 1901, Proc. N. E. Zool. Club, 2, p. 76 (= Chimaera).

Head moderately pointed, without a proboscis. Body compressed, tapering to a point at the tail. Pectoral fins large, free. First dorsal fin short, with

a strong spine, erectile, near the head. Second dorsal low, elongate. Caudals narrow, tapering; subcaudal without a produced lobe. Anal small or indistinct. Teeth all receiving impact on the edges. Mandibulars, palatines, and vomerines with tritors on the forward edges of the laminae. Lateral line an open canal, specially modified in the apertures on the head. Tail with or without a filamentary appendage. Vertebral axis in the tail on about the same level as that of the body. Notochord surrounded by narrow rings. Hemispheres of the brain close to the olfactories, more distant from the optic lobes. Claspers of the male trifid, rarely bifid. Males with erectile frontal and prepelvic tenacula.

CHIMAERA.

Chimaera LINNÉ, 1751, Mus. Ad. Fridl., **1**, p. 53; 1758, Systema, **1**, p. 236; 1766, Syst., **1**, p. 402.

Snout soft, prominent, not produced. Mouth inferior. Tritors on the dental laminae in the form of rods. Lateral line of the head with zigzag openings. Anal fin present and distinct; or united with the subcaudal; or rudimentary.

Anal fin distinct from the subcaudal

Caudal filament long

Eyes large

Second dorsal not indented on the upper margin

Lateral line in short waves on the flank

Claspers divided two thirds of their length

Mottled, clouded, and banded with brown

monstrosa

Lateral line irregular, not waved

Claspers divided one third of their length

Iridescent dark brown, with lighter streaks on tail

purpurascens

Mottled with light, tail with light streaks

ovstomi

Lateral line in short waves on the flank

Claspers divided one half their length *phantasma*

Anal fin not distinct

Caudal filament long

Eyes large

Second dorsal not indented

Lateral line not in short waves

Claspers trifid half their length *nitsukurii*

- Lateral line not waved
 Blackish with lines and spots of white . . . *australis*
- Lateral line irregular
 Claspers trifid, each branch expanded
 Blackish with white spots . . . *barbouri*
- Eyes large
 Second dorsal deeply indented
 Dark brown . . . *mirabilis*
- Eyes moderate
 Lateral line in short waves on the flank
 Brownish with spots and narrow bands . . . *ogilbyi*
- Caudal filament short
 Eyes small
 Second dorsal not indented
 Lateral line with few and weak undulations
 Leaden brown . . . *gilberti*
 Brownish . . . *affinis*
 Brown . . . *waiti*
- Eyes large
 Second dorsal fin divided
 Brown with white spots
 Claspers appearing bifid . . . *media*
- Second dorsal deeply indented, not divided
 Brown with white spots
 Claspers bifid, two branches joined as one . . . *collicii*

CHIMAERA MONSTROSA.

- Semua marina* GÜSSNER, 1558, Hist. Ad., **4**, p. 1053; ALDRICH, 1613, Pisc. and Cet., p. 105; JONST., 1619, Pisc. and Cet., p. 29, pl. 6, f. 6.
- Galeus piscis catolcus* CUVIER, 1605, Enot., p. 136; JONST., 1619, *loc. cit.*, pl. 45, f. 2.
- Centrina* ALDRICH, 1613, *loc. cit.*, p. 102, 103.
- Galeus acanthias clausi catolcus* WILL., 1686, Hist. Pisc., p. 57, pl. 139, f. 6; RAY, 1713, Syn. Pisc., p. 23.
- Chimaera monstrosa* LINNÉ, 1751, Mus. Ad. End., **1**, p. 53, pl. 25; 1758, Systema, **1**, p. 236; 1766, Syst., **1**, p. 401; MÜLL., 1774, Nat. Syst., **3**, p. 276; MÜLL., 1776, Zool. Dem. Prodr., p. 38; 1779, Neuer Schamplatz, **8**, p. 86; BLOCH, 1785, Anst. Fische, **1**, p. 61, pl. 124; DACH., 1787, Endl. Meth., Poiss., p. 202; BONN., 1788, Ichth., p. 13, pl. 8, f. 25; GÜBEL, 1789, Linn. Syst., **1**, p. 1488; WALB., 1792, Art. Gen. Pisc., p. 587; SCHN., 1801, Bl. Ichth., p. 319; TETR., 1806, Syst. Nat., **1**, 913; 1807, Brit. Fauna, p. 111; DON., 1807, Brit. Fish, pl. 111; RISso, 1810, Ichth. Nice., p. 53; CUV., 1817, R. Anim., **2**, p. 110; 1829, R. Anim., **2**, p. 382; ROSENTH., 1821, Ichthyot. taf., III, p. 16, taf. 27; ANSLAN, 1828, Syst. Besch., Vissch., **4**, p. 62; FLEM., 1828, Brit. Anim., p. 172; FABER, 1829, Fisch. Isl., p. 11; NILSS., 1832, Prodr., p. 112; 1855, Skand. Fisk., p. 705; JEN., 1835, Man., 494; BENNETT, 1839, Beechey's Voy., Fishes, p. 72, pl. 23, f. 3; BONAP., 1841, Fn. Ital., Pesci, pl. —;

- Agass., 1844, Poiss. Foss., **3**, p. 337, pl. C; GRAY, 1854, Chondr., p. 24; COSTA, 1852, Fin. Nap., Pesci, Chim., p. 4, pl. 4-7; KROY, 1853, Danm. Fiske, **3**, p. 784; DRUM., 1865, Elas., p. 686; CAR., 1868, Journ. Ac. Lisb., **2**, p. 138; GUNT., 1870, Cat., **8**, p. 349; CANEST., 1872, Ital. Pesci, p. 62; COLL., 1875, Norg. Fiske, p. 206; POEY, 1876, Ann. Soc. Esp., **5**, p. 182, pl. 8; 1866, Repert., **1**, p. 242; HUMREUR, 1876, Ned. Arch. Zool., **3**, p. 255, pl. xvii, f. 2, 3, 5; MALM, 1877, G. och B. Fin. Rygg., p. 605; WINN., 1879, Prodr. Ichth. Dan., p. 56; GRAD., 1880, Ellen. Pisc., p. 51; MOR., 1881, Poiss. Fr., **1**, 455; DOB., 1881, Man., **2**, p. 16; DAY, 1884, Brit. Fishes, **2**, 286, pl. 151; VANL., 1887, Poiss. Trav. and Tal., p. 89, pl. 4, f. 2; GARW., 1888, Bull. M. C. Z., **17**, p. 73, pl. 2; 1901, Bull. M. C. Z., **41**, p. 272, pl. 7, f. 1-2, pl. 11, and pl. 13, f. 1; HOLT and CARB., 1895, Trans. Roy. Dub. Soc., (2) **5**, p. 368; GOODE and BEAN, 1896, Oc. Ich., p. 31; JOHN. and EVERM., 1896, Bull. 17 U. S. Nat. Mus., p. 91.
- Callorynchus atlanticus* GROENOVUS, 1772, Act. Helvet., **7**, p. 49; GRAY, 1854, Gron. Cat., p. 16.
- Callorynchus americanus* GROEN., 1772, *loc. cit.*, p. 49.
- Chimaera argentea* ASCAN., 1772, Icon., pl. 45.
- Le Roi des Harings du Nord* DAVIE, 1787, Encl. Meth., Poiss., 202.
- Chimaera praeusta* WALE., 1792, Art. Gen. Pisc., p. 588.
- La Chimère Arctique* LAC., 1798, Poiss., **1**, 392, pl. 19, f. 1.
- Chimaera borealis* SHAW, 1801, Zool., **5**, pt. 2, p. 365, pl. 157.
- Northern Chimaera* SHAW., l. c.
- Chimaera mediterranea* RISSO, 1826, Hist. Nat. Eur. Mér., **3**, p. 168.
- Rabbit-Fish* FLEM., 1828, Brit. Anim., p. 172.
- Chimaera cristata* FABER, 1829, Fisch. Isl., p. 45.
- King of the Herrings* YARR., 1836, Brit. Fish., **2**, 364.
- Callorynchus centrina* GRAY, 1854, Gron. Cat., p. 15.
- Arctic Chimaera* COUCH, 1867, Brit. Fish., **1**, 115, pl. 34.

Chimaera monstrosa, the type species of the genus, has the head compressed, subconical; snout soft, rather blunt, without rostral appendages; body compressed; caudal section tapering from the body-cavity to a long filament at the end of the tail. First dorsal fin triangular, close to the head, short, deep, preceded by a strong erectile spine and followed by a low dermal fold. Second dorsal low, three times as long as the head, extending two thirds of the length above the caudal region; not indented on the upper margin, reaching above the origin of the caudal. Length of body from end of snout to origin of supracaudal about five times the length of the head. Caudal fins low, rising slowly in front, and descending very gradually backward. Anal small, rising slowly, separated by a narrow notch from the subcaudal. Ventrals far in the forward half of the total length; claspers of the male trifid nearly two thirds of their length, the third section being slender and styliform. Pectorals large, one and one third times or more as long as the head, reaching behind the origins of the ventrals; hinder margins slightly concave. Lateral line less wavy than in *C. phantasma*. Eye large, lateral. Dorsal spine nearly as long as the head, denticulate on the hinder edges, reaching behind the origin of the second dorsal. Five to seven tritors on each of the vomerine dental laminae. Attaining a length of three feet and upwards.

Brown, reddish to silvery or golden on the upper surface; more or less clouded and blotched with brown, irregularly scattered or in longitudinal streaks;

fins with darker outer margins. Varying much in individuals; sometimes plain on the back shading to silver-white or yellow below.

Northern Atlantic, from the Mediterranean and Cuba to Norway and Iceland, descending to depths of 600 fathoms or more.

CHIMAERA PURPURASCENS.

Chimaera purpurascens JORDAN and SNYDER, 1901, Smith. Misc. Coll., **45**, p. 235 (name and note of color).
Chimaera jordani TANAKA, 1905, Journ. Coll. Sci. Tokyo, **20**, p. 2, pl. 1, f. 1; 1911, Fishes of Japan, **1**, pl. X, f. 30.

Head one fifth of the length from the snout to the caudal fin, or nearly one third of the length of the second dorsal fin. Dorsal spine as long as the head, reaching when applied to the back behind the origin of the second dorsal. Base of first dorsal twice as long as the interdorsal space, which latter is traversed by a dermal fold. Anal separated by a notch from the subcaudal. Claspers of male trifid one third of the length, hardly longer than the ventral fin. Eye large, two sevenths of the head length. Subcaudal fin hardly as deep as the supracaudal fin. Lateral line irregular with few and weak undulations; jugular branch joining the orbital near the junction of the latter with the angular and the suborbital branches.

Dark brown, with light streaks lengthwise below the lateral line on the tail. Japan.

CHIMAERA OWSTONI.

Chimaera owstoni TANAKA, 1905, Journ. Coll. Sci. Tokyo, **20**, p. 10, pl. 1, f. 2, 3; 1911, Fishes of Japan, **1**, p. 18, pl. V, f. 17, 18.

Head little more than one fifth of the length from the end of the snout to the caudals, and more than one third of the base of the second dorsal. Dorsal spine as long as the head, reaching beyond the origin of the second dorsal. Dorsals joined by a fold between them, its length less than that of the first dorsal base. Pectorals long, reaching little beyond the origin of the ventrals. Claspers of male short, trifid less than half their length, second branch smaller than the club-shaped first one, third branch styliform, pointed, crooked at the end. Anal separated from the subcaudal. A caudal filament. Upper outline of the second dorsal slightly concave near the middle of its length. Caudals subequal in depth. Lateral line rather irregular, but not wavy; jugular branch meeting the orbital near the junction of the latter with angular and suborbital.

Brown with lighter spots on body and head, with a lighter streak along the base of the second dorsal and with another one above and two or three other similar ones below the lateral line on the tail between ventrals and caudal.

A close ally if not a variety of the preceding.

Japan.

CHIMAERA PHANTASMA.

Chimaera monstrosa SCHLEGEL, 1850, Poiss. Jap., p. 300, pl. 132.

Chimaera phantasma JORDAN and SNYDER, 1900, Proc. U. S. Nat. Mus., **23**, p. 338; 1904, *ibid.*, **27**, p. 223; DEAN, 1904, Journ. Coll. Sci. Tokyo, **19**, p. 3, pl. I, f. 3, 4.

Head nearly one fourth of the length from snout to end of second dorsal, equal to two fifths of the length of the second dorsal base; equals more than the depth of the body, or to nearly four times the length of the orbit. First dorsal rather small, spine reaching the origin of the second dorsal. Height of second dorsal about equal to that of the orbit; upper margin not concave. Caudal filament more than twice as long as the head; caudal fins narrow, hardly one third of the length of the orbit in width. Anal fin narrow, small, distinctly separated from the subcaudal. Pectorals wide, reaching behind the bases of the ventrals, hind margins slightly concave. Outer angles of the pectorals and the ventrals rather sharp. Claspers of male twice as long as the ventral fin; divisions extending more than half their length. Waves in the lateral line along the flank short and shallow. The supracaudal fin is a very little deeper but much shorter than the subcaudal; the latter being continued for a long distance below the filament.

Greyish brown, somewhat streaked or blotched longitudinally on the flanks; with or without small spots or vermiculations of darker near the bases of the dorsals. Several streaks of darker on the caudal section. Lateral line dark.

Sagami Bay, Japan. Alan Owston.

CHIMAERA MITSUKURII.

Chimaera phantasma JORDAN and FOWLER, 1903, Proc. U. S. Nat. Mus., **26**, p. 669.

Chimaera mitsukurii JORDAN and SNYDER, 1904, Proc. U. S. Nat. Mus., **27**, p. 234, f. 2; DEAN, 1904, Journ. Coll. Sci. Tokyo, **19**, p. 6, pl. I, f. 1-2.

Head approximating one fifth of the length from snout to end of second dorsal, little less than one third of the length of the base of the latter fin. Second dorsal not indented on the upper border. Pectorals reaching behind the bases of the ventrals. Anal not distinct. Caudal filament more than three times the

length of the head. Supracaudal little deeper than subcaudal. Dorsal spine reaching behind the origin of the second dorsal. Eye large, length more than one third of that of the head, twice the height of the second dorsal. Lateral line not wavy, but slightly irregular; jugular section meeting the angular a short distance below the junction of orbital and angular. Clasper of male extending little behind the ventral fins, trifid about half of its length.

Silvery brown, whiter below; fins darker outwards.

Sagami Bay, Japan.

CHIMAERA AUSTRALIS.

Chimaera monstrosa var. *australis* HECTOR, 1902, Trans. and Proc. New Zeal. Inst., **34**, p. 239, pl. 11, C, D; WAITE, 1907, Rec. Cant. Mus., **1**, p. 9.

Measurements taken from the type are: total length 36, depth 4, snout to orbit 2.5, snout to dorsal spine 6, dorsal spine 3, base of dorsal 3.5, interdorsal space 3, base of second dorsal 16, snout to pectoral 5, snout to ventral 16, caudal fin 5, and filiform appendage 7 inches.

Hector's text describes *Chimaera monstrosa* var. *australis* without interrogation marks. The measurements were taken from the female specimen, the text from both sexes, as also the outlines on the plate. The figures given are named "Chimaera coliei (= *C. monstrosa* var. *australis* ?) female. D.—male." The outlines exhibit a short second dorsal without indentation on the upper edge, an indistinct anal fin, and, on the male, a bifid clasper and a continuous second dorsal and supracaudal.

"Colour.—Olive-black above, silvery-white beneath the head, and dark-grey elsewhere. Head with small ocellated spots, and round the base of the dorsal five distinct white spots. As far back as the vent three rows of nine spots in each, and one broad but interrupted line of white. A pseudo-lateral line of fifty-three pores marked by golden scales, which latter are also found on other parts. On the tail are thirteen bold white blotches, in continuation of the white lateral line on the body."

Wairau Bay. New Zealand.

CHIMAERA BARBOURI.

Chimaera barbouri GARMAN, 1908, Feby., Bull. M. C. Z., **51**, p. 255; TANAKA, 1911, Fishes of Japan, **1**, p. 16, pl. 4, f. 14, pl. 5, f. 19.
Chimaera spilota TANAKA, 1908, March, Journ. Coll. Sci. Tokyo, **23**, p. 15.

Head little more than one fifth of the length to the end of the second dorsal, two fifths of the second dorsal base. Second dorsal two and one half times as

long as the head; greatest depth equal length of orbit, depth in the mid length half as much; border rising posteriorly to nearly the anterior height. Pectorals large, reaching the bases of the ventrals, hind margins slightly concave. No distinct anal. Dorsal fins united by a low fold; interdorsal space shorter than the base of the first dorsal. Dorsal spine about two thirds as long as the head. Eye two sevenths the length of the head. Supracaudal fin slightly the deeper; subcaudal the longer; a caudal filament. Lateral line irregular, but not in short waves; jugular branch meeting the postorbital near the junction of the latter with the suborbital and the angular. Claspers of male short, stout, trifid more than half their length; the three branches being somewhat similarly expanded toward the distal end.

Blackish, with spots of white on the flanks.

Japan: Aomori, near Tsugaru Strait; Off Ōtsu, Province Hitachi.

CHIMAERA MIRABILIS.

Chimaera (Bathygobius) mirabilis COLLETT, 1904, Forh. Vid. Selsk., Chra., No. 9; 1905, Report on the Norwegian Fishery and Marine-Investigations, **2**, p. 35, pl. 1, f. 4.

Head nearly two ninths of the length from snout to supracaudal, little more than one third as long as the second dorsal base. Outer angles of pectorals rather blunt, hind margins convex. Ventrals convex posteriorly. Interdorsal space short. Pectorals long, reaching behind the origins of the ventrals. Subcaudal longer, deeper, and extending farther forward than the supracaudal. Caudal filament long. No anal fin. Lateral line bending abruptly upward close behind the junction with ocular and orbital; jugular section meeting the angular, at a distance below the junction of the latter with the orbital and the suborbital sections. Forehead prominent in front of the eye. Orbit large, half as long as the head, in an individual 432 mm. long. Dorsal spine as long as the base of the fin, two thirds as long as the head, reaching the origin of the second dorsal. Height of anterior and posterior portions of second dorsal about half the length of the orbit, the concave middle portion descending to about one third the height of the anterior. Dorsal notch hardly separating the two dorsals.

Greyish brown, fins darker.

Faroe Channel; Faroe Bank, at 750-1200 metres.

CHIMAERA OGILBYI.

Chimaera ogilbyi WAITE, 1898, Thetis Prelim. Report, p. 56; 1899, Mem. Austral. Mus., 4, p. 48, pl. 6.

Head one fourth of the length from snout to supracaudal, about three sevenths of the length of the second dorsal. Eye small, length near one fifth of the head. Upper margin of second dorsal not indented. Outer angles of pectorals and ventrals sharp. No anal fin. Caudals low, supracaudal little higher than subcaudal. Pectorals reaching beyond the origins of the ventrals. Dorsal spine hardly reaching the base of the second dorsal. Lateral line with short waves on the greater part of the flank; jugular section meeting the orbital near the junction of the latter with angular and suborbital sections. Caudal filament elongated.

Silvery on back and sides, yellowish below. Toward the back of the head on the body there are narrow darker bands passing down and obliquely forward. Anteriorly there are small spots which become rings farther down. Posteriorly the twenty or more transverse streaks above the lateral line are more or less broken.

Off N. S. Wales, at 22-26 fathoms.

CHIMAERA GILBERTI, NOM. NOV.

Chimaera purpurascens GILBERT, 1905, Bull. U. S. Fish Comm., pt. 2, p. 585, f. 231, not *C. purpurascens* Jordan and Snyder, 1904.

Named in honor of Professor Charles H. Gilbert.

Head less than one fourth of the length from snout to end of second dorsal. Eye one fifth as long as the head; front of orbit in mid length of head. Dorsal spine little more than half the length of the head, not serrated, reaching the base of the second dorsal. Greatest depth of second dorsal equal to the length of the orbit, upper border not concave. No separate anal. Pectoral large, reaching beyond the origins of the ventrals, not falciform, rather broad. Subcaudal larger than supracaudal. A caudal filament. Lateral line feebly undulated; jugular section meeting the angular at the junction with orbital and suborbital sections. Type 90 cm. in length.

Uniform purplish or plum color.

Off Kauai, Hawaii, at 957-1067 fathoms.

CHIMAERA AFFINIS.

Chimaera affinis CAPRILO, 1868, Journ. Math. Phys. e Nat. Lib., **4**, p. 314, pl. 3, f. 1, 1'; GÜNTHER, 1870, Cat., **8**, p. 350; JORDAN and EVERM., 1896, Bull. 47 U. S. Nat. Mus., p. 95; GOODE and BEAN, 1896, Oc. Ich., p. 31, 509, pl. 10, f. 32-55.
Chimaera plumbea GILL, 1877, Dec. 22, Bull. Phil. Soc. Wash., **2**, p. 182; JORDAN and GILBERT, 1883, Bull. 16 U. S. Nat. Mus., p. 54.
Chimaera abbreviata GILL, 1884, Proc. U. S. Nat. Mus., **6**, p. 251.

Head about three-fourteenths of the length from snout to end of second dorsal. Bases of dorsals connected by a fold. Second dorsal not indented on its upper edge. Pectorals large, not reaching the bases of the ventrals. Outer angles of ventrals sharp. Dorsal spine more than half as long as the head, hardly keeled in front. Subcaudal about as wide as the supracaudal. No separate anal fin. Eye small, less than one-sixth as long as the head. Caudal filament short. Lateral line with few and weak undulations; jugular branch meeting the postorbital near the junction of the latter with the suborbital and the angular sections. Clasper of male trifid in the distal third of its length.

Uniform plumbeous.

North Atlantic, from Portugal westward, in depths of from 300 to more than 900 fathoms.

CHIMAERA WAITER.

Hypobolus (Psychrolithus) waiter FOWLER, 1908, Proc. Acad. Nat. Sci. Phil., p. 419, f. 1.

Head three-elevenths of the length from end of snout to end of second dorsal, little more than half of the second dorsal base. Dorsal spine as long as the head in a twelve-inch specimen, keeled in front, reaching the origin of the second dorsal. No distinct anal. Subcaudal rather narrower than supracaudal. Caudal filament short. Eye small. Lateral line not wavy in the middle of the side; jugular section meeting the postorbital near the junction of the latter with the angular and the suborbital sections. Second dorsal not indented in the upper edge.

Type about twelve inches in length.

Coast of Victoria, Australia.

CHIMAERA MEDIA, sp. nov.

Eye large, length of orbit nearly one-third of that of the head. Head about one-fourth of the distance from snout to supracaudal, nearly half as long as the base of the second dorsal. Dorsal spine longer than the head on a female,

shorter on a male, keeled in front, hind edges serrated. Indentation of the upper margin of the second dorsal deeper than that of *C. collicii*, dividing the fin into two distinct unequal sections of which the anterior is the shorter. No anal fin. Subcaudal slightly deeper and longer than the supracaudal; caudal filament rudimentary. Hind margins of ventrals slightly concave; outer edges of these fins longer on female, inner edge longer on male. Pectorals subfalciform, twice as long as wide, hind margin indented, outer angle sharp. Clasper of male trifid, similar in shape to that of *C. collicii*, apparently bifid but having the second and third divisions free, not bound together by the skin. In other words the skin of the second division of the clasper is not fused around the distal end of the third division, though the two are closely connected with one another. Lateral line nearly straight along the flank; jugular section meeting the postorbital near the junction of the latter with the angular and the suborbital. Description taken from a female of 22 inches and an adult male of 20 inches.

Colors resembling those of *C. collicii* but less red and more silver; spots of white are scattered on the sides much as in that species.

In shape and coloration these specimens resemble others of *C. collicii*, but they are somewhat more elongate, have larger eyes, more falciform pectorals, divided second dorsals, and the clasper is completely trifid.

Types No. 330, Mus. Comp. Zool.

Locality uncertain.

CHIMAERA COLLIER.

Chimaera collieri BENNETT, 1839, Beechey's Voy., Fishes, p. 71, pl. 23, f. 1-2; GIR., 1858, Pacific R. R. Rept., **10**, p. 360; DUM., 1865, *Elys.*, 689; GUNT., 1870, *Cat.*, **8**, p. 350; JORDAN and GILBERT, 1883, Bull. 16 U. S. Nat. Mus., p. 55; GARM., 1904, Bull. M. C. Z., **41**, p. 272; DEAN, 1906, *Chim. Fishes and Devel.*, pl. 1-11, figs.

* *Hydrolagus collieri* GILL, 1862, Proc. Acad. Nat. Sci. Phil., p. 331 (name only); JORDAN and EVERM., 1896, Bull. 17 U. S. Nat. Mus., p. 95; GOODL and BEAN, 1896, *Oc. Ich.*, p. 32, pl. 10, f. 36.

Eye rather large, two sevenths or less of the length of the head. Head nearly one fourth of the length from snout to supracaudal, little more than half the length of the second dorsal. Pectorals broad, not twice as long as wide; hind margin slightly convex near the outer angle. Outer ends of the ventrals rounded; claspers of male short, not reaching end of ventral fin; apparently bifid more than half their length, the cartilages being trifid but two of the three being bound together by the skin at their distal ends. Sub- and supracaudals about equal in height. Second dorsal nearly twice the length of the head, highest forward, continuous, but descending in the mid length to about one fourth of

the anterior height then rising to about three times the height of the middle portion. Interdorsal space equal to the base of the first dorsal, traversed by a low fold. Vomerine teeth with from five to seven rods. Lateral line on the flank nearly straight; jugular section meeting the postorbital near its junction with the suborbital and the angular. Dorsal spine not reaching the origin of the second dorsal. Anal rudimentary or absent.

Back brownish, shading to white or yellowish below; sides with numerous irregular rounded spots of white or yellow.

Near the shores, California and northward.

RHINOCHIMAERIDAE.

Rhinochimaeridae GARMAN, 1901, Proc. N. E. Zool. Club., **2**, p. 77; 1904, Bull. M. C. Z., **41**, p. 270.

Head elongate. Snout much produced, in a slender point. Pectorals large, free. First dorsal with a strong, erectile spine, fin short, close to the skull. Second dorsal low. Anal not distinct from the subcaudal. Subcaudal well developed, without a produced lobe. Caudals tapering backward to a filament. Lateral line an open groove with closely set ribs. Notochord surrounded by narrow rings, unsegmented.

Hemispheres of the brain remote from the olfactories and the optic lobes, connections very slender. Males with a frontal tenaculum and prepelvic tenacula. Claspers of the male slender, distally ending in a volute knob with hooked spines.

Snout compressed

Cutting edges of vomerine plates not sinuous, without tritors

Upper edge of supracaudal spinose *Rhinochimaera*

Snout depressed

Cutting edges of vomerines sinuous or notched, with tritors

Upper edge of supracaudal not spinose *Harriotta*

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RHINOCHIMAERA.

Rhinochimaera GARMAN, 1891, Proc. N. E. Zool. Club., **2**, p. 75.

This genus is distinguished by an elongate compressed snout, a nearly straight forehead; teeth without tritors, notches, or sinuations on their cutting edges; a low supracaudal fin the upper edge of which is armed with spines, and, on the male sex, by a shortness and straightness of the stem of the frontal tenaculum, induced by lack of curvature of the forehead.

RHINOCHIMAERA PACIFICA.

Harriotta pacifica MITSUKURI, 1895, Zool. Mag. Tokyo, **7**, p. 97, fig.

Rhinochimaera pacifica GARMAN, 1904, Proc. N. E. Zool. Club., **2**, p. 75; 1904, Bull. M. C. Z., **41**, p. 247, pl. 1, pl. 2, f. 1-2, pl. 3, f. 1, 4-5, pl. 4, f. 2-4, pl. 5, f. 1-2, pl. 8-9, pl. 12, pl. 14.

Rhinochimaera (Harriotta) pacifica DEAN, 1904, Journ. Coll. Sci. Tokyo, pl. 1-2.

Snout narrow, high, produced, pointed. Body, head, and snout compressed; back hardly elevated above the level of the snout and the tail. Forehead continuous into the snout, not decurved. First dorsal subtriangular; spine not reaching the origin of the second dorsal. Second dorsal low, hardly as wide as the orbit, little longer than the snout, as long as the space between the origins of the pectorals and those of the ventrals. Ventrals small, nearly as large as the first dorsal. Pectorals large, broad, not reaching the origins of the ventrals. Supracaudal very low, armed on the upper edge with spines, in a double row. Subcaudal much larger, longer, and wider; width about that of the orbit. Caudal filament about as long as the snout. No anal fin. Lateral line nearly straight from the ocular and the orbital sections backward to a point below the origin of the supracaudal; jugular section meeting the orbital a short distance behind the junction of the latter with the suborbital and the angular; prenasal section not passing up on the side of the snout but continued forward between the nasal and the suborbital to the subrostral. See figures in Garman, 1904, Bull. M. C. Z., **41**, pl. 2, f. 1 and 2. Teeth with sharp cutting edges, without notches or undulations, Garm., *loc. cit.*, pl. 5, f. 1 and 2. An adult male is about three feet in length, a female about four.

Sides and below light silvery olive or plumbeous brown; back, tail and fins distally darker.

Japan.

HARRIOTTA.

Harriotta GOODE and BEAN, 1904, Proc. U. S. Nat. Mus., **17**, p. 471.

The snout in this genus is elongate, depressed, and somewhat flattened; the forehead curves down in front to the snout; the teeth have tritons and sinuous or notched cutting edges; the supracaudal is of moderate height and not armed by spines on its upper edge, and the frontal tenaculum of the male has an elongate much curved stem to comport with the downward curvature of the forehead.

HARRIOTTA RALEIGHANA.

Harriotta raleighana GOODE and BEAN, 1891, Proc. U. S. Nat. Mus., **17**, p. 172, pl. 19; 1896, Oc. Ich., p. 33, pl. xi; JORDAN and EVERM., 1896, Bull. 17, U. S. Nat. Mus., p. 96, pl. 19, f. 12; GARM., 1901, Bull. M. C. Z., **41**, p. 263, pl. 2, f. 3-5, pl. 4, f. 1, pl. 5, f. 3-9; DEAN, 1906, Chin. Fish and Devel.; BEAN and WELD, 1910, Proc. U. S. Nat. Mus., **37**, p. 662, pl. 38.

Body and head compressed. Snout much produced, depressed, pointed. Forehead prominent, curving downward from crown to snout. First dorsal high, short, subtriangular. Second dorsal low, elongate, nearly as long as the head and snout together. Pectorals large, reaching the origins of the ventrals. Ventrals small. No anal. Supracaudal low, about half as wide as the subcaudal, without spines on its upper edge; subcaudal much wider and longer, origin near a vertical from the end of the second dorsal. Lateral line nearly straight along the middle of its length; prenasal branch passing from the nasal outward in a broad curve to the side of the snout, between the suborbital and the nasal, where it continues forward and curves inward to the subrostril; jugular section meeting the orbital behind the junction of the latter with the suborbital and the angular. Each vomerine tooth with from seven to nine tritors (rods) on the cutting edge. Palatine teeth with three more or less complete longitudinal series of tritors: the outer of small rounded tritors on the cutting edge, the second of small ones forward and large broad ones, forming a pavement, backward, the third irregular, composed of small and short tritors. The mandibular teeth have a series of rods on the cutting edge in the forward half, and two series of tritors in the posterior half, the inner being continuous with the forward series and composed of broad pavement-like tritors. The very young have no tritors and the numbers and shapes vary greatly with age. As with other chimaeroids the young have two rows of dorsal scales.

Brown.

Off the Coast of the United States, in the Western North Atlantic, 707 to 1080 fathoms.

HARRIOTTA CHAETIRHAMPHUS.

Antlochochimaera chaetirhamphus TANAKA, 1909, Journ. Coll. Sci. Tokyo, **27**, 8, p. 7, pl. 4; 1911, Fishes of Japan, **1**, p. 10, pl. III, f. 11, pl. IV, f. 15-16.
Harriotta chaetirhamphus BLAN and WEED, 1910, Proc. U. S. Nat. Mus., **37**, p. 661, pl. 39.

Snout much produced, depressed, pointed. Body elongate, compressed, back not elevated. Forehead convex from crown to snout. Mouth small. Teeth with sinuate cutting edges; vomerines with six to seven rods; mandibulars

with three prominences, cutting edge adjoining the median prominence concave, "six distinct rods occur on both sides of the same prominence." Pectoral broad, reaching far beyond the origin of the ventral. Ventrals small, nearly equal to first dorsal. No anal fin. Supracaudal moderately developed, without spines on its upper margin; subcaudal much larger, longer, and more than twice as deep, origin farther forward near a vertical from the end of the second dorsal. Caudal filament four and one third times the diameter of the eye. Hind margins of pectorals and ventrals convex, outer angles bluntly rounded. Lateral line somewhat nearly straight; jugular section meeting the postorbital a short distance behind the junction of the latter with the suborbital and the angular. Frontal tenaculum of the male with a much curved stem, agreeing with the convexity of the forehead. Clasper simple, slender, reaching the hind margin of the ventral, with a rounded knob beset with prickles at the distal end.

Brownish, darker below, fins edged with blackish.

Type an adult male of more than 31 inches (80 cm.) Closely allied to *H. ralceighana* if not identical.

Outside Okinose, Sagami Sea, Japan, in depths of 400 fathoms.

HARRIOTTA ATLANTICA.

Rhinochimaera atlantica HOLM and BYRNE, 1909, Ann. Mag. Nat. Hist., (8), **3**, p. 279.

"Diagnosis. Adult male with the snout (measured between verticals from its tip to the origin of the vomerine dental plates) as long as the distance between the dorsal insertions of the pectoral and ventral fins and somewhat longer than the base of the second dorsal fin. Second dorsal fin with base about half as long as the distance between the gill-openings and the origin of the ventral lobe of the caudal fin. Posterior ventral claspers terminating in subconical slightly volute clubs. Vomerine dental plates deeply notched on their cutting edges."

The specimen described was about 45.8 inches (1165 mm.) in total length, nearly 31 inches from the end of the snout to the supracaudal fin. It was taken on the Irish Atlantic Slope. The description as given above would place the species in *Harriotta* rather than in *Rhinochimaera*. Probably the type represents a male of *Harriotta ralceighana*, the largest species of *Rhinochimaeridae* known.

CALLORYNCHIDAE.

Callorhynchidae GARMAN, 1901, Proc. N. E. Zool. Club, **2**, p. 77; 1901, Bull. M. C. Z., **41**, p. 271.

Head short, pointed; snout with a flexible proboscis ending in a retrorse leaf-shaped distal extremity. Body compressed, tapering backward and becom-

ing slender in the tail. Pectorals large, free. First dorsal near the occiput, short, with a strong spine, erectile. Second dorsal short. Anal fin farther back than the dorsal, distinct from the subcaudal. Teeth with the tritors receiving the impact on the sides instead of the edges. Tritors of palatines and mandibulars on the sides of the laminae. Lateral lines tubular. Notochord without rings. Hemispheres of the brain nearer to the optic lobes than to the olfactorys, connections slender. Caudal axis slightly raised from the level of that of the body. Male with slender simple claspers, appearing as if rolled into a tube, jointed near the end; and with a frontal tenaculum and two prepelvic tenacula.

CALLORYNCHUS.

Callorynchus GÜNTHER, 1851, Mus. Ichth., **1**, p. 59; 1856, Mus. Ichth., **2**, p. 12; 1863, Zooph., **1**, p. 31; LINNÉ, 1756, Systema, ed. 9, p. 12; CUV., 1817, R. An., **2**, p. 110.

Until other genera are added the characters of the family are those of the genus. Body and head somewhat deeper than wide. Vomerine teeth unlike those of *Chimaera*, without the rods, so called. Mandibular and palatine dental laminae with one to two tritors each. In young stages, and in some species throughout life, the tritors are longitudinal parallel bars on the side of the lamina. With age and use in some species the tritors posteriorly expand until contiguous tritors of certain pairs meet and fuse to form doubled, u-shaped tritors with the prongs extended forward. Because of such changes the identification of species either living or fossil by the teeth should be undertaken only with great caution. These modifications were described and figured by Garman, 1904, *Chismopnea*, Bull. M. C. Z., **41**, p. 256-257, plates 6, 7. A more or less produced lobe on the subcaudal fin. Caudal filament moderate to short or absent. Frontal tenaculum of male with a wide stem and a broad articulation.

Tritors two on each palatine tooth, not fused in adults

Pectoral fins not reaching the ventrals

Tritors strong, longitudinally parallel bars *smithii*

Tritors on the palatines fusing in adults

Pectorals reaching beyond mid bases of ventrals

Tritors with thick unequal prongs, outer shorter

Origin of first dorsal little behind that of the pectoral

callorynchus

Pectorals reaching nearly to mid base of ventrals

Tritors with long slender pointed prongs, subequal

Origin of first dorsal forward of ends of pectoral bases

capensis

Pectorals reaching nearly or quite to bases of ventrals

Tritors with short thick prongs, outer very short

Origin of first dorsal somewhat in advance of pectoral bases

mili

Pectorals?

Tritors far back, on hinder half of lamina *triloris*

CALLORYNCHUS SMYTHII.

Pogajallo, Pou-sou-Cog, D-men-ella, Elephant, FREZIER, 1716, Relat. du Voy. de la mer du Sud aux côtes du Chili et du Perou, p. 110, f. A.

La Chimère antarctique LAC., 1798, Poiss., **1**, p. 100, pl. 12, f. 1.

Callorynchus callorynchus CUV., 1817, R. Anim., **2**, p. 110.

Callorynchus smythii BENNETT, 1839, Beccley's Voy., Fishes, p. 75, pl. 22, f. 3; DEW., 1865, Elas., 697; GARMI, 1901, Bull. M. C. Z., **41**, p. 271, pl. vi, f. 1-4.

Callorynchus antarcticus GUNT., 1870, Cat., **8**, p. 351 (part); VALL., 1888, Miss. Sci. Cap Horn, Poiss., p. 16; GARMI, 1888, Bull. M. C. Z., **17**, p. 71, pl. 3-4; PHILL., 1892, Ann. Mus. Nac. Chile, pl. 4.

In specimens at hand the pectorals do not reach the ventrals by nearly the length of the orbit. The origin of the second dorsal is above the origins of the ventrals; the end of the base of this fin is a little forward from the anal. There is a slender caudal filament. The lateral line is affected by short waves between the ventrals and the anal below the second dorsal. The tritors of the dental laminae are commonly elongate bars, as in the young, not being swollen and fused posteriorly; thus there are two tritors on each of the palatine laminae where in other species there is but one. The colors vary greatly: in young individuals there may be black spots on the bases of the dorsals, on the tip of the second dorsal, in a row along the lateral line (4-5) from the second dorsal forward, and there may be a large spot below the eye with another above the pectoral; also one on each of the ventrals and one on the subcaudal. Large specimens are more or less uniform silvery and vary from light to dark.

Off the coasts of Chile and Peru.

CALLORYNCHUS CALLORYNCHUS.

Callorynchus GROENOVUS, 1751, Mus. Ichth., **1**, p. 59, pl. iv; 1756, *loc. cit.*, **2**, p. 12; 1763, Zooph., **1**, p. 31, pl. iv.

Callorynchus callorynchus LINNÉ, 1756, Systema, ed. 9, p. 12; GARMI, 1901, Bull. M. C. Z., **41**, pl. 7, f. 7-9, pl. 10; STARKS, 1906, Proc. U. S. Nat. Mus., **30**, p. 764.

Chimaera callorynchus LINNÉ, 1758, Syst., **1**, p. 236; 1766, Syst., **1**, 402; MÜLL., 1774, Nat. Syst., **3**, p. 277; 1779, Neuer Schimpfplatz, **8**, p. 86; DAUR., 1787, Enc. Meth., Poiss., p. 336; BONN., 1788, Ichth., p. 11; GMEL., 1789, Linn., Syst., **1**, p. 1189; WALB., 1792, Art., Gen. Pisc., p. 634; SCHN., 1801, Bl. Ichth., p. 350, pl. 68.

Chimaera australis SHAW, 1801, Zool., **5**, pt. 2, p. 368, pl. 158; SWAINSS., 1838, Fishes, **1**, p. 126, f. 9^b.

- Chimaera elephantinus* Bory, 1823, Dict. Class. d'Hist. Nat., **3**, p. 61; Gray, 1851, Chondr., p. 15.
Callorhynchus antarcticus BENNETT, 1839, Beechey's Voy., Fishes, p. 75; DUMÉnil, 1865, Elas., p. 693 (part), pl. 13, f. 1, 2, pl. 14, f. 2; GÜNT., 1870, Cat., **8**, p. 351 (part); HUMBERT, 1876, Ned. Arch., Zool., **3**, 225; pl. xvii, p. 1, 4, 7, 9; SAUR, 1898, Exp. Terre de Feu, Poiss., p. 66, pl. vi, f. 13.
Callorhynchus peronii DUMÉnil, 1865, Elas., p. 694.
Callorhynchus argenteus PHILL., 1892, Ann. Mus. Nac. Chile, ser. 1, p. 11, pl. v, f. 1.
Le Roi des Harangs du Sud D'AR., 1787, Encl. Meth., Poiss., p. 336; BOSS., 1788, Ichth., p. 14.

Pectorals reaching half way across the bases of the ventrals, longer than those of *C. smythii*, little shorter than those of *C. capensis*. Origin of the first dorsal slightly behind the origins of the pectorals. Origin of the second dorsal nearly above the origins of the ventrals; end of the base of the second dorsal somewhat farther forward than the origin of the anal. Subcaudal lobe produced to a point anteriorly, behind the anal. Interdorsal space about one and one fifth times the length of the base of the first dorsal. Dorsal spine about twice as long as the distance from the spine to the orbit. Each palatine lamina of the adult specimens at hand has but a single tritor; the fused portion of this is massive and broadly rounded; the prongs in front are rather short and thick, the outer one being especially so.

Lateral line irregular and waved much like that of *C. capensis*. The frontal tenaculum, as in all the species of the genus, when viewed from above is subtriangular, broad on the articulation, wide and short in the stem.

Brownish silvery. A dorsal band of deeper brown is interrupted by the fins, and younger specimens have a dark spot immediately in front of the dorsal spine and a dark area above the orbit. Very young are more spotted. Variations are numerous.

Off coasts of southern South America.

CALLORHYNCHUS CAPENSIS.

- Callorhynchus capensis* DUMÉnil, 1865, Elas., p. 695, pl. 13, fig. 5-5'; GARM., 1901, Bull. M. C. Z., **41**, p. 271, pl. 6, f. 5, 6.
Callorhynchus antarcticus GÜNT., 1870, Cat., **8**, p. 351 (part).

Pectorals appearing long and pointed, reaching the bases of the ventrals and beyond. Origin of the first dorsal a little forward of the insertions of the pectorals; spine more than twice as long as its distance from the orbit, reaching two thirds of the distance from the origin of the first dorsal to that of the second. Origin of the second dorsal little behind a vertical from the origins of the ventrals. Lateral line decidedly irregular, with short bends.

On a thirty-three inch specimen the frontal tenaculum is not yet through the skin, the dorsal spine is one and one third times the length of the space between

the dorsals, but does not reach the second dorsal by about one fourth of the length of the spine; the pectorals reach the middle of the ventral base; the origin of the second dorsal is a little backward from the origins of the ventrals; the claspers are small, only half an inch in length, apparently less mature than the frontal tenaculum, and the ventral tenacula are foreshadowed by a very narrow slit in the skin below the bases of the fins. The palatine teeth are figured in the article on the Chismopnea, pl. 6, fig. 5-6; the longitudinal bars of the tritor have fused posteriorly; forward their extremities remain as slender subequal points. There is a slender caudal filament, shorter than the head.

Flanks plain silvery white, a trifle darker above the pectorals and forward toward the orbit. The dorsum is darker from the head to the caudal. The fins are darker and become lighter toward the hind borders.

The species named *C. hectori* by Newton, 1876, was founded on a fossil palatine tooth that cannot be distinguished from the teeth of the specimen from which the present notes are taken.

Cape Good Hope.

CALLORYNCHUS MILII.

- Callorynchus milii* BORY, 1823, Diet. Class. d'Hist. Nat., **3**, p. 62, pl. v; GARM., 1901, Bull. M. C. Z., **41**, p. 266, 271, pl. 6, f. 7-8.
Callorynchus tasmaniensis RICH., 1841, Proc. Zool. Soc. Lond., p. 29; 1841, Trans. Zool. Soc., Lond., **3**, p. 174; DUM., 1865, Elas., p. 696.
Callorynchus australis HOBSON, 1842, Tasm. Journ. Sci. Agr. Stat., **1**, p. 11; OWEN, 1845, Odont., p. 61, pl. 28, f. 1.
Callorynchus antarcticus GÜST., 1870, Cat., **8**, p. 351 (part); HEER., 1901, Trans. and Proc. New Zeal. Inst., **34**, p. 239, pl. xiv, f. A. & B.
Callorynchus dasycaudatus COLEMAN, 1879, Trans. and Proc. New Zeal. Inst., **11**, p. 298, pl. xvii, fig. 1.
Callorynchus callorynchus WAITE, 1907, Rec. Cant. Mus., **1**, p. 9.

Pectorals rather broad, hardly reaching to the bases of the ventrals. Origin of the first dorsal very little in advance of the origins of the pectorals. Origin of the second dorsal above the axils of the ventrals. Anal narrow, pointed, deeper than the produced lobe on the anterior end of the subcaudal; origin a little backward of the end of the base of the second dorsal. Caudal fins tapering, slender posteriorly; filament short or absent. Dorsal spine not reaching to the second dorsal by a considerable space. Lateral line with many short irregular bends below the space between the first dorsal and the caudal. Hinder margins of the ventrals concave. The tritors on the palatine laminae of the young are straight bars; later they become reduced in number by fusion into a U-shape. On larger specimens the anterior prongs of the tritor become more thickened, and are more nearly equal in length than in *C. callorynchus*. In

fact *C. milii* is very closely allied to *C. capensis*. A young individual of sixteen inches has the tritors separate posteriorly, but the space between them is very narrow; posteriorly they are much swollen though anteriorly slender and pointed.

Flanks silvery; a vertebral space and the top of the head brownish; a brownish blotch above the base of the pectoral and an indefinite brownish band below the silvery one along the course of the lateral line.

Australia, Tasmania, and New Zealand.

CALLORYNCHUS TRITORIS.

Calloorynchus tritoris GARMAN, 1901, Chismopnea, Bull. M. C. Z., **41**, p. 271, pl. 6, f. 9.

The type of this species is a nearly complete skeleton. The tritors of the palatines are on the posterior half of the lamina and have changed so greatly from the ordinary form, of the U-shape, that they are broader than long and the prongs have almost completely disappeared. Vomerine and palatine dental laminae are illustrated by the figure mentioned above.

Mexillones, Peru.

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